Collection System Condition Management Program

Collection System Condition Management Program - Getting Ahead of the Emergency Repairs
Current Situation – Area of Concern

The TWA Collection System serves almost 100,000 wastewater accounts through:

- 21,858 manholes
- 833 miles of gravity mains

- 421 Lift Stations
- 318 miles of force mains

- 8 Water Reclamation Facilities

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Current Situation – Area of Concern

The TWA Collection System serves almost 100,000 wastewater customers through:

- 21,858 manholes
- 833 miles of gravity mains

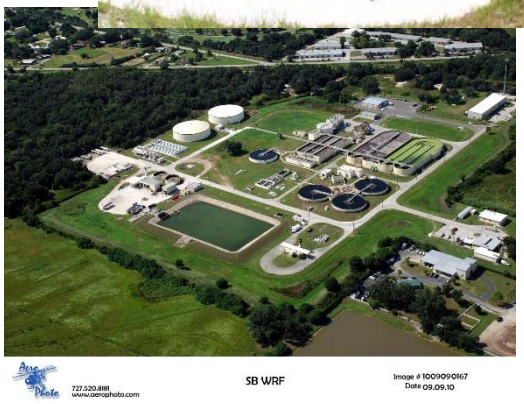
The reliability of these assets are managed through the following Programs

- Condition Assessment program by TWA CCTV Crew and contractors
- Capital Improvement Program to reduce Inflow and Infiltration (I&I) and address known deficiencies
- "Ready response" of Field Services personnel through reactive, preventive and planned work orders

- 421 Lift Stations
- 318 miles of force mains

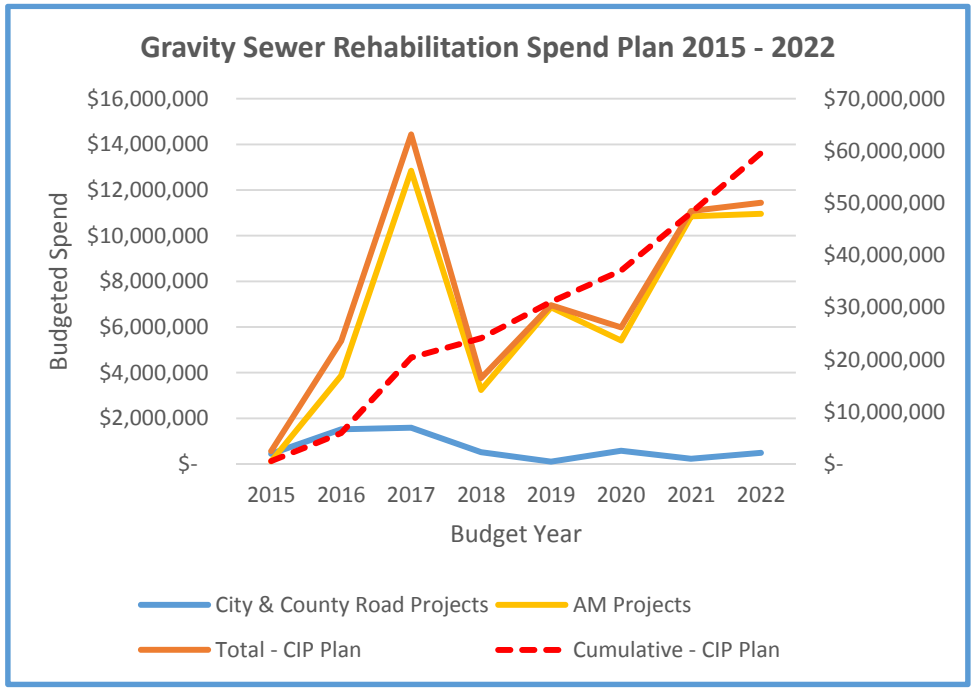
- In-house Condition Assessment of Lift Stations (LS)
- Preventive Maintenance Program
- In-house LS Rehabilitation Program funded through the Capital Improvement Program

- 8 Water Reclamation Facilities



- Plant Expansions, Modification and Major Maintenance activities funded through the Capital Improvement Program

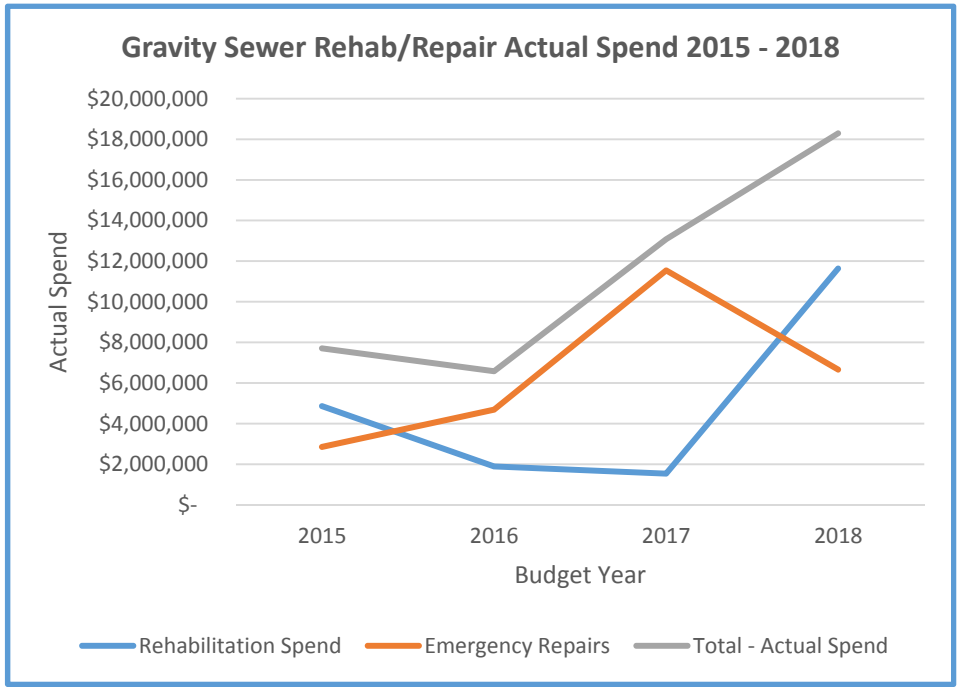
Collection System Condition Management Program - Getting Ahead of the Emergency Repairs
Current Situation – What is TWA Investing?



- City & County Road Projects
- Asset Management (AM) projects
  - Inflow and Infiltration (I&I) Rehab
  - Collection System Rehabilitation
  - Preventive Maintenance - Metallic Gravity Main
  - Collection System Sealing & Lining
  - Emergency Sewer Repairs
  - Manhole Ring and Lid Replacements

	2015	2016	2017	2018	2019	2020	2021	2022
Planned Spend								
City & County Road Projects	$ 446,609	$ 1,514,650	$ 1,589,178	$ 518,005	$ 100,000	$ 579,000	$ 227,000	$ 486,000
Asset Management (AM) Projects	$ 118,391	$ 3,871,850	$ 12,848,322	$ 3,238,995	$ 6,857,000	$ 5,406,000	$ 10,850,000	$ 10,956,000
Total - CIP Plan	*$ 565,000*	*$ 5,386,500*	*$ 14,437,500*	*$ 3,757,000*	*$ 6,957,000*	*$ 5,985,000*	*$ 11,077,000*	*$ 11,442,000*
Cumulative - CIP Plan	*$ 565,000*	*$ 5,951,500*	*$ 20,389,000*	*$ 24,146,000*	*$ 31,103,000*	*$ 37,088,000*	*$ 48,165,000*	*$ 59,607,000*
Actual Spent								
Rehabilitation Spend	$ 4,859,171	$ 1,890,093	$ 1,538,298	$ 11,638,596	$ -	$ -	$ -	$ -
Emergency Repairs								
Engineering	$ 848,815	$ 2,255,264	$ 2,616,535	$ 1,235,484	$ -	$ -	$ -	$ -
Field Service	$ 1,979,861	$ 2,433,733	$ 8,914,714	$ 3,200,000	$ -	$ -	$ -	$ -
Maintenance Operations	$ 19,152	$ -	$ 8,351	$ -	$ -	$ -	$ -	$ -
Total - Emergency Spend	*$ 2,847,828*	*$ 4,688,997*	*$ 11,539,600*	*$ 6,653,226*				
Total - Actual Spend	*$ 7,706,999*	*$ 6,579,091*	*$ 13,077,898*	*$ 18,291,822*	*$ -*	*$ -*	*$ -*	*$ -*

Collection System Condition Management Program - Getting Ahead of the Emergency Repairs
Current Situation – What is TWA Investing?



- Rehabilitation Spend includes scheduled project work
  - Rehab/Replacement identified from Assessments
  - Rehab/Replacements required due to Road Projects
- Emergency Repairs
  - Repairs and Replacements that require an accelerated schedule to restore normal services, insure Public Safety, eliminate impacts on the normal flow of traffic

	2015	2016	2017	2018	2019	2020	2021	2022
Planned Spend								
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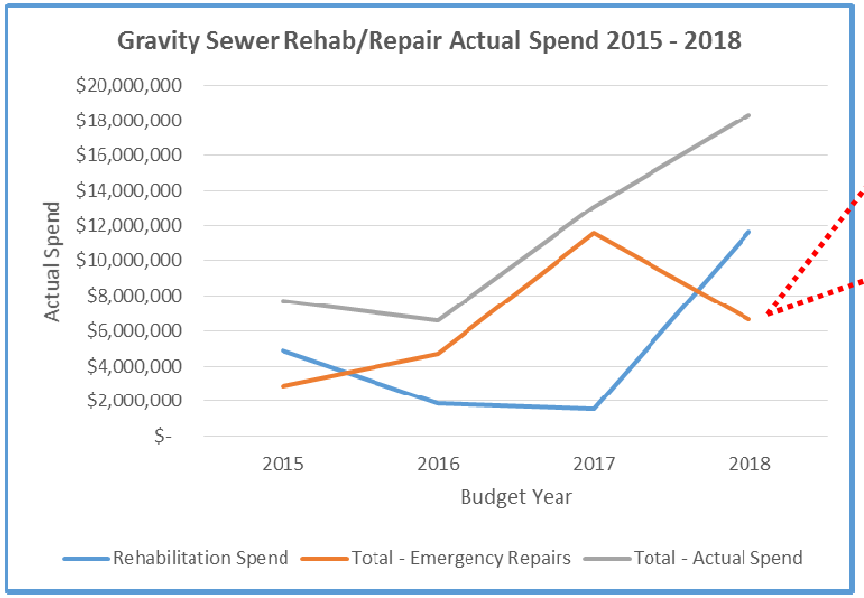
Collection System Condition Management Program - Getting Ahead of the Emergency Repairs Analysis – Budgetary Significance of Emergency Repairs



- Emergency Repairs have consumed an increasing percentage of budgeted rehabilitation funds
  - 2015 – 37%
  - 2016 – 71%
  - 2017 – 88%
  - 2018 – 36%

- Continued number of Emergency Repairs will result in
  - additional budget impacts or
  - the redirection of budget intended for the Gravity Sewer Assessment Program and the rehabilitation identified as by the program

Getting the greatest "bang for the buck"

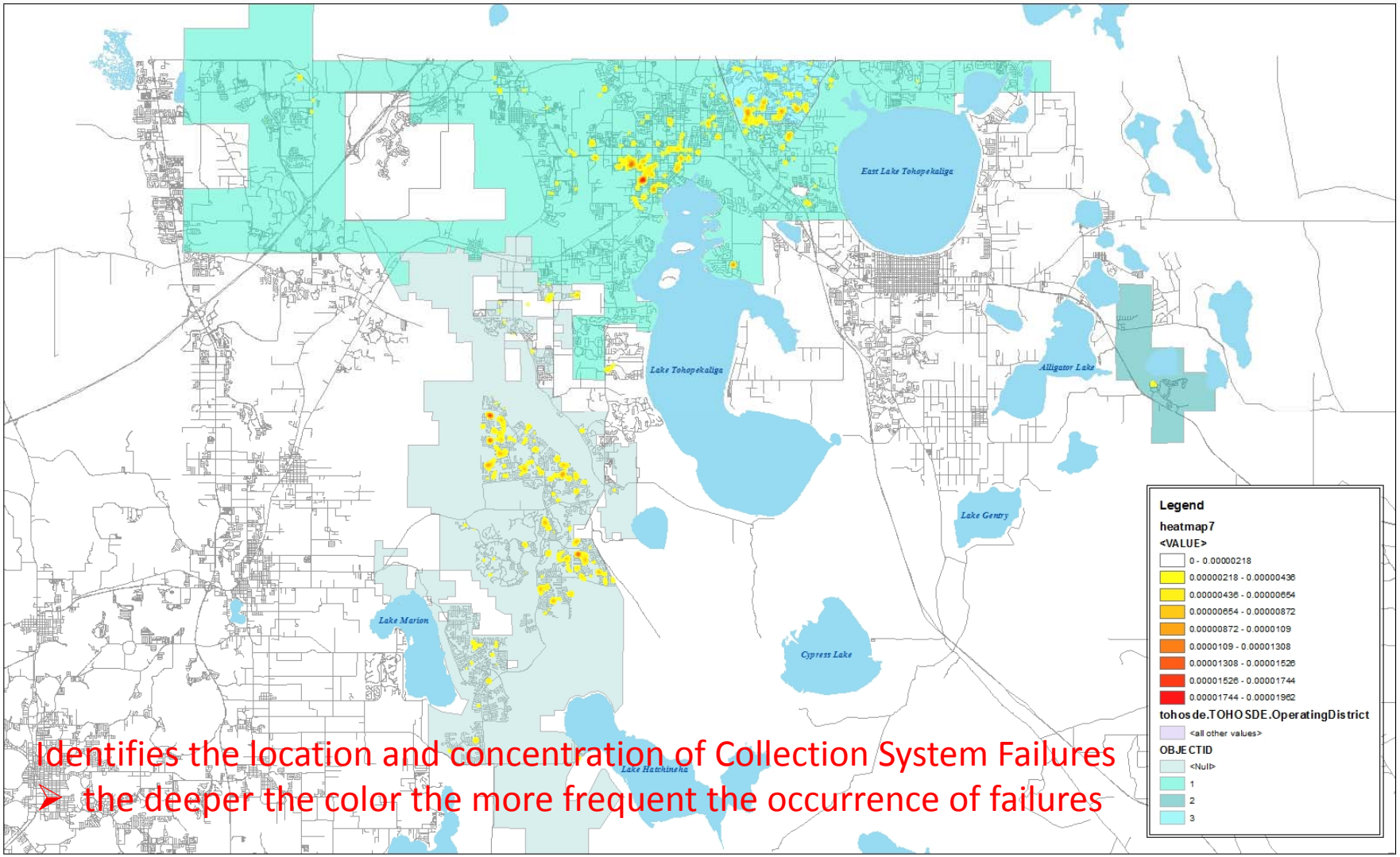
- Emergency Repairs cost more than scheduled rehabilitation projects – on average over 10 times more

	Max	Average	Min
Scheduled	$ 3,294	$ 757	$ 50
Emergency	$ 60,072	$ 8,682	$ 467

- *Statistics are from gravity sewer rehabilitation projects over the last 3 years*

Collection System Condition Management Program - Getting Ahead of the Emergency Repairs
Analysis – Where are the failures occurring?

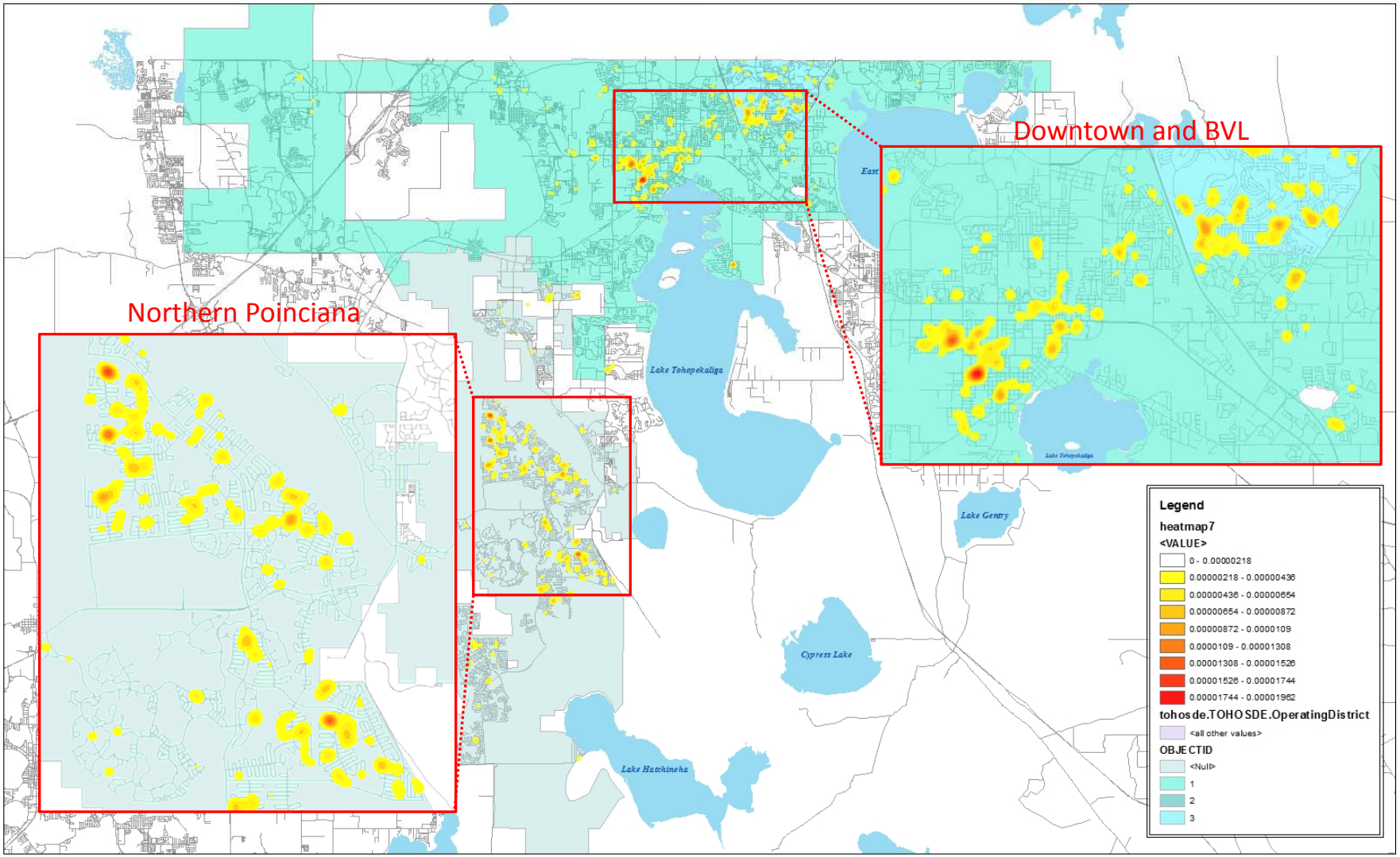
TWA Service Area - Heat Map for Collection System Failures



- Identifies the location and concentration of Collection System Failures
- the deeper the color the more frequent the occurrence of failures

Collection System Condition Management Program - Getting Ahead of the Emergency Repairs Analysis– Where are the failures occurring?

TWA Service Area - Heat Map for Collection System Failures

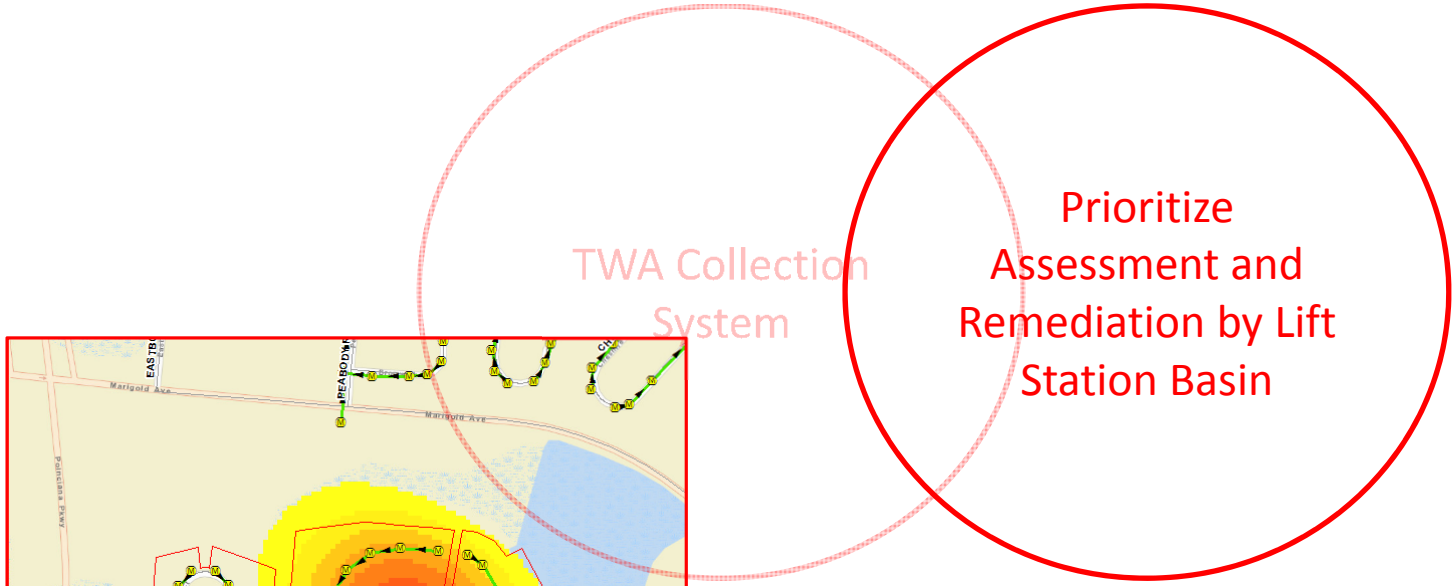


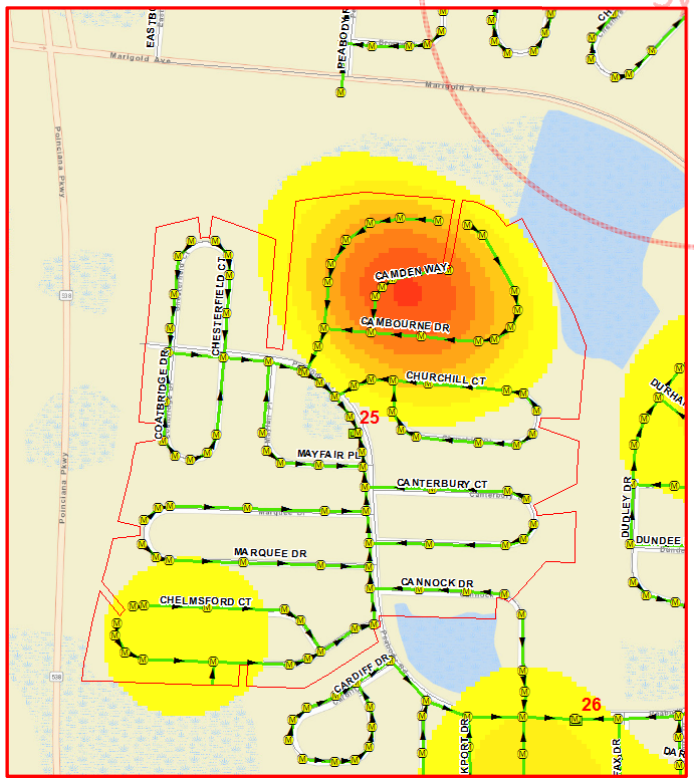
Collection System Condition Management Program - Getting Ahead of the Emergency Repairs Analysis – Focusing in on what is possible

- Total of 833 miles of gravity sewer
- Clean and Assessment Cost - $10,117,000
  - *based on current continuing contract unit costs*
- Rehabilitation / Repair / Replacement Cost - $366,885,589
  - based on remediation cost per lf from Year 1 and 2 Condition Assessment Program

- Project Estimate Cost to address entire system - $377,003,000

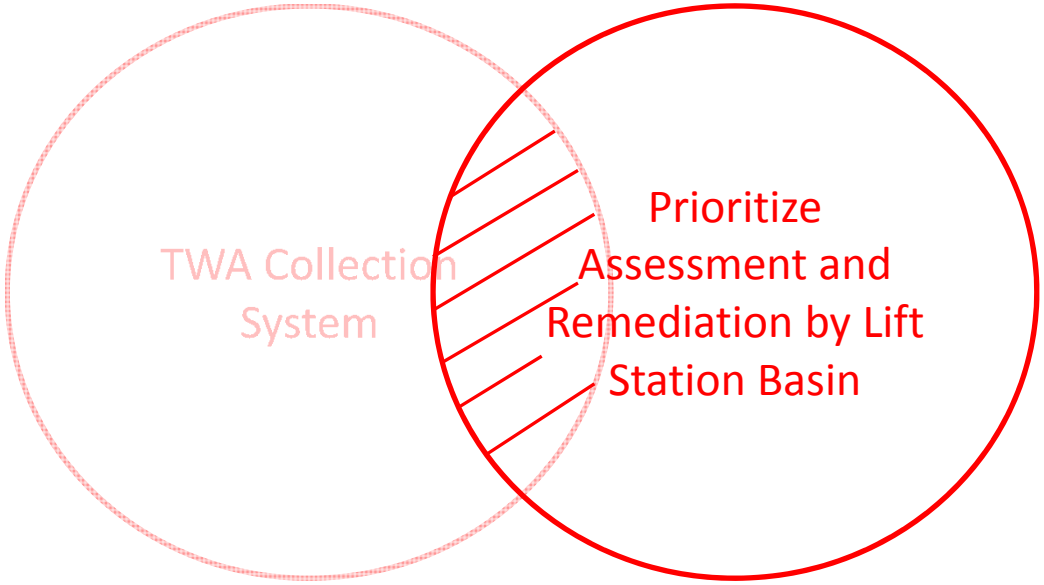
Collection System Condition Management Program - Getting Ahead of the Emergency Repairs
Analysis – Focusing in on what is possible





- A "Lift Station Basin" includes all of the gravity sewer the flows directly to a lift station (LS# 25 shown as example)
- Lift Station Basins were prioritized by criticality using three factors
    1. Infiltration and Inflow score (40%)
    2. Number of Collection System Failures per lineal foot (30%)
    3. Number of Sanitary Sewer Overflows per lineal foot (30%)

Collection System Condition Management Program - Getting Ahead of the Emergency Repairs Analysis – Focusing in on what is possible



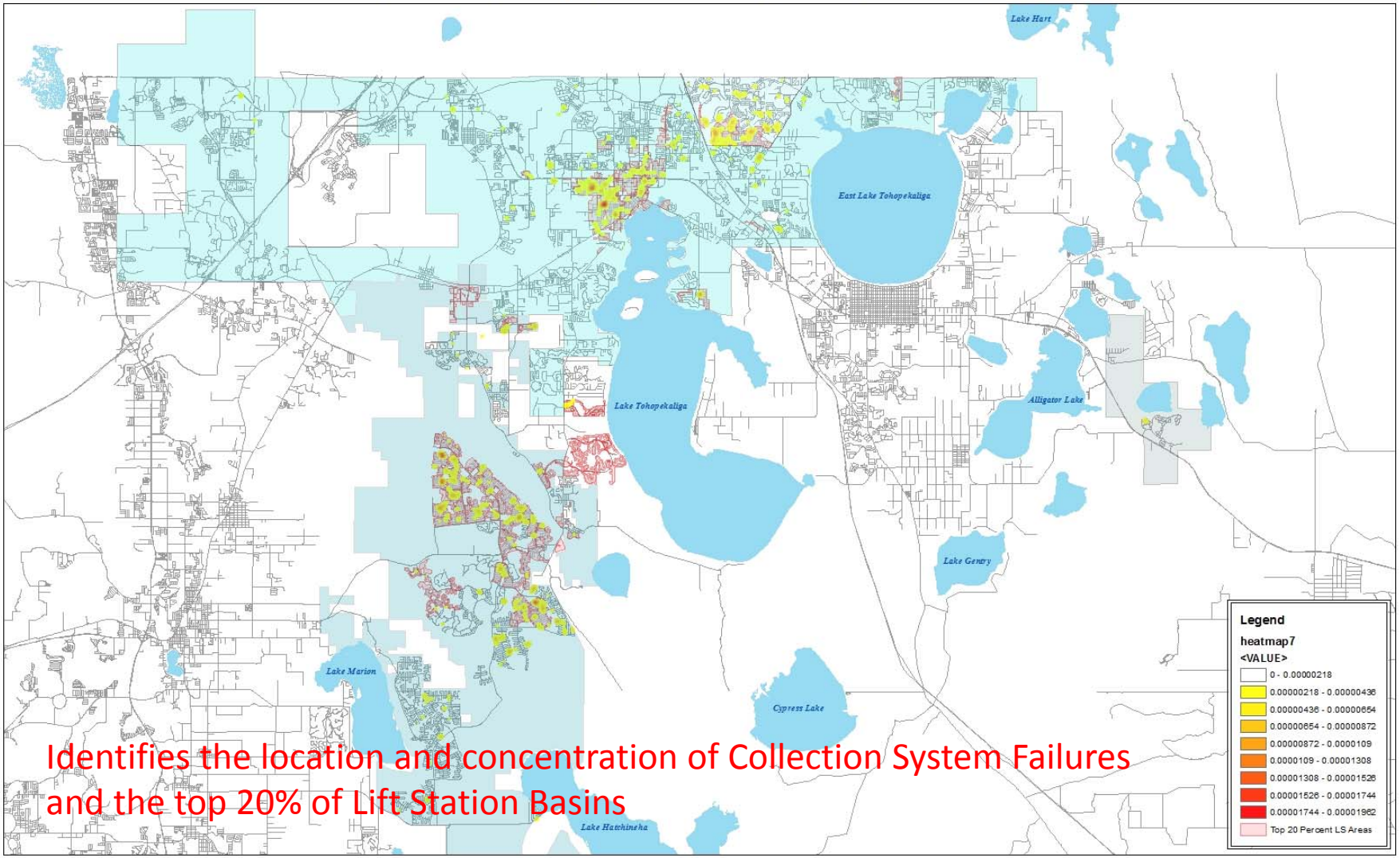
By focusing on the highest 20% of the prioritized Lift Station Basins the scope of the program is reduced to

- Total of 170 miles of gravity sewer
- Clean and Assessment Cost - $2,071,000
  - *based on current continuing contract unit costs*
- Rehabilitation / Repair / Replacement Cost - $60,324,000
  - based on remediation cost per lf from Year 1 and 2 Condition Assessment Program

- Project Estimate Cost to address targeted area - $62,395,000

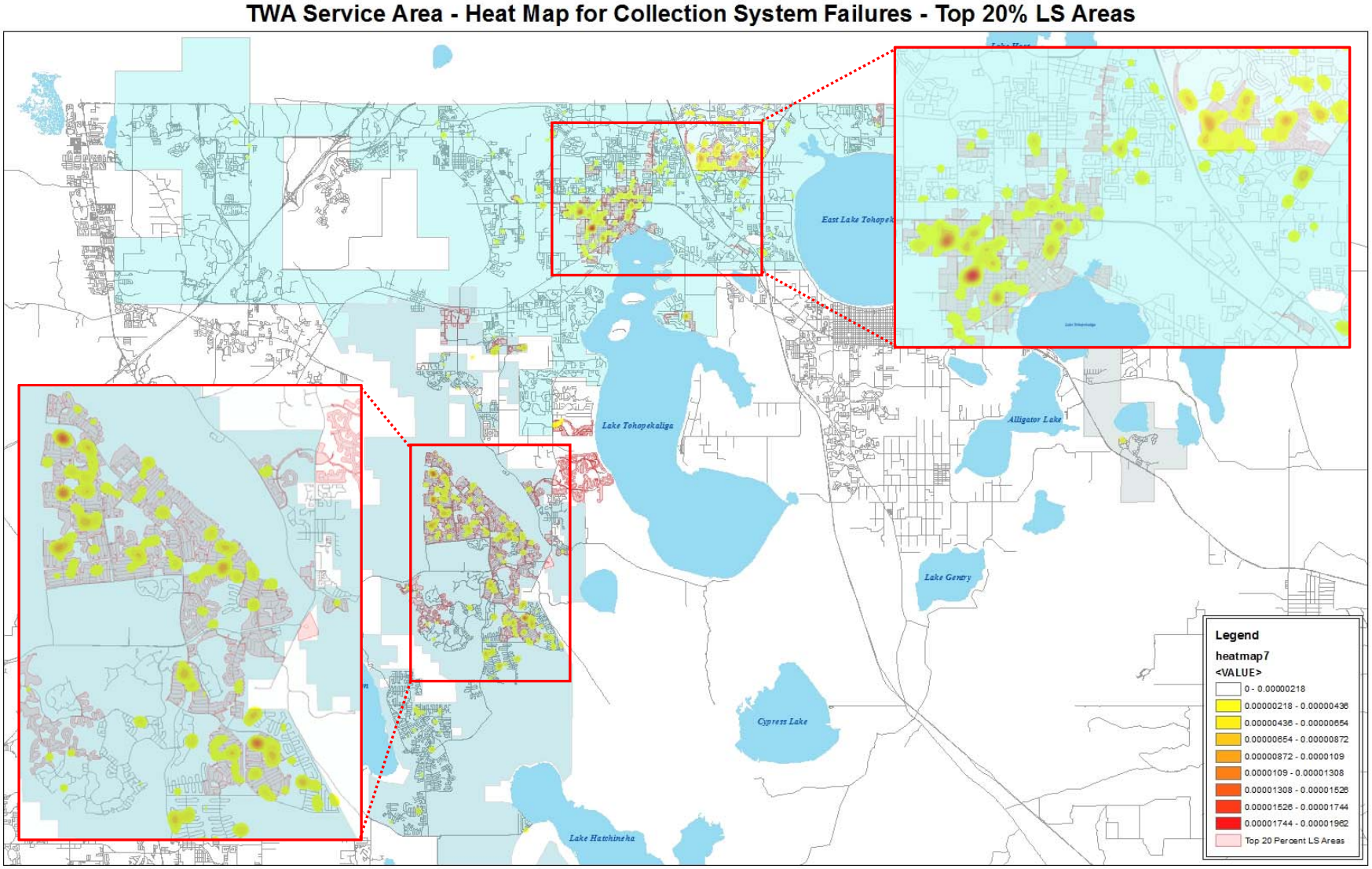
Collection System Condition Management Program - Getting Ahead of the Emergency Repairs Analysis – Do Priority Basins include Failure Areas?

TWA Service Area - Heat Map for Collection System Failures - Top 20% LS Areas



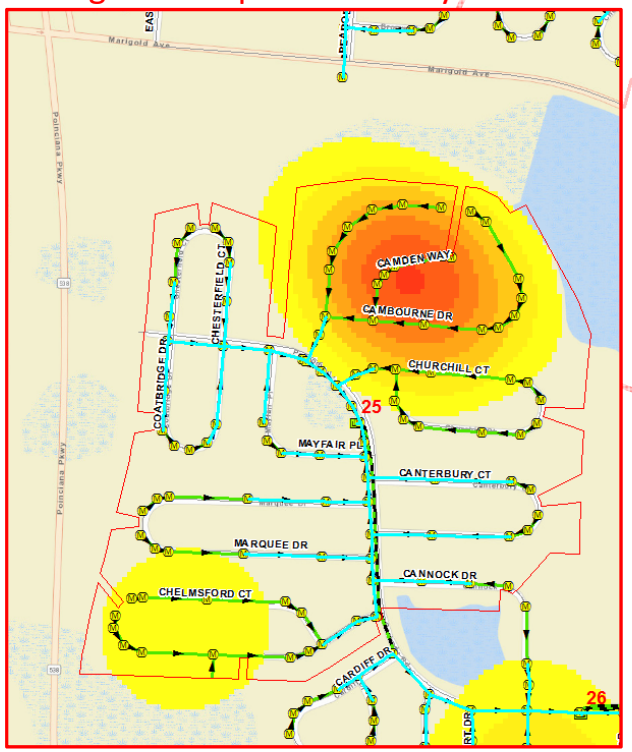
Identifies the location and concentration of Collection System Failures and the top 20% of Lift Station Basins

Collection System Condition Management Program - Getting Ahead of the Emergency Repairs Analysis– Do Priority Basins include Failure Areas?



Collection System Condition Management Program - Getting Ahead of the Emergency Repairs Analysis – Focusing in on what is possible

High Consequence Gravity Mains



WA Collection System

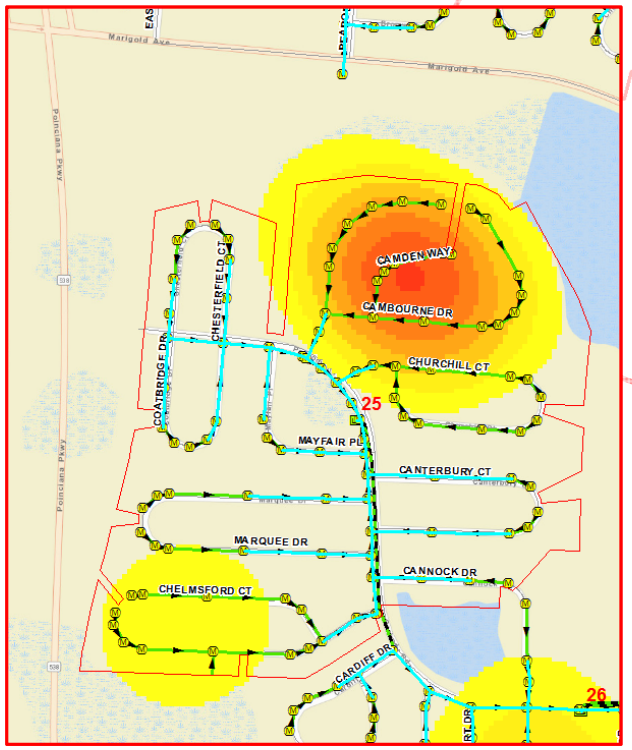
Prioritize Assessment and Remediation by Lift Station Basin

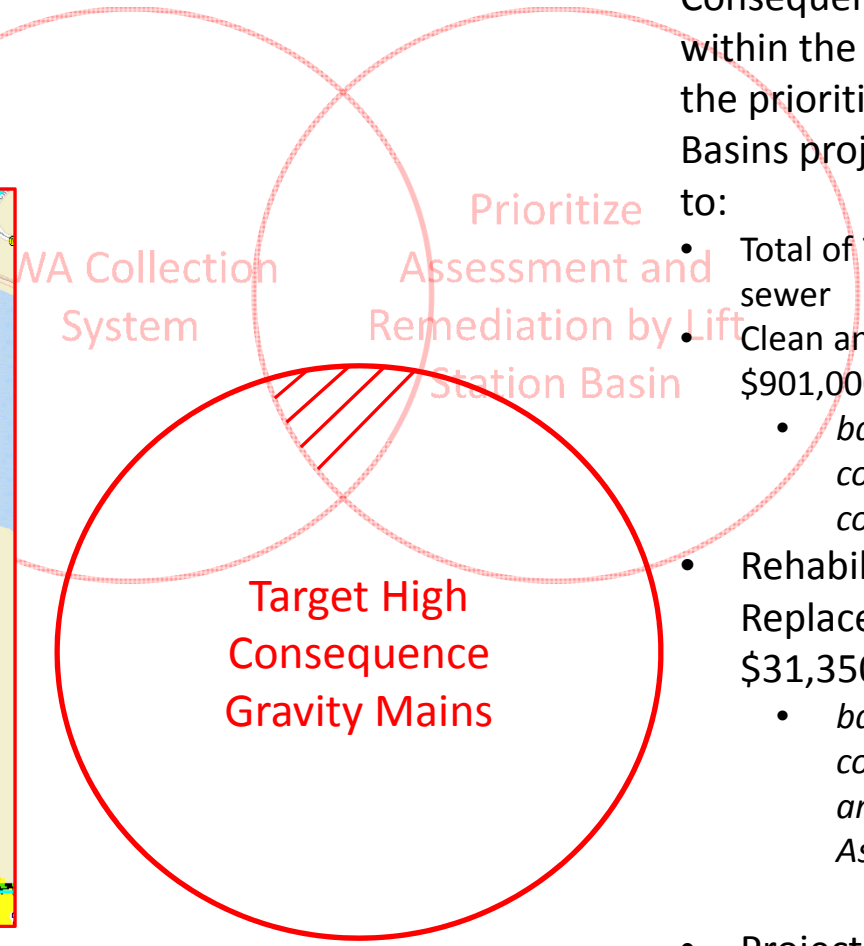
Target High Consequence Gravity Mains

- The existing management program involves assessment of all of the gravity mains and manholes within the selected Lift Stations Basins
- Alternative approach would include assessment of "High Consequence" gravity mains
  - primary trunk mains
  - gravity mains carrying flow from force main drops
  - gravity mains that are coincident with primary roads
  - deep gravity mains
- Alternative approach addresses the attributes that are the greatest drivers for Emergency Repair Costs
  - Depth
  - Flow rate
  - Maintenance of Traffic
  - Restoration

Collection System Condition Management Program - Getting Ahead of the Emergency Repairs Analysis – Focusing in on what is possible

High Consequence Gravity Mains





By focusing on High Consequence gravity mains within the the highest 20% of the prioritized Lift Station Basins project scope reduced to:

- Total of 74 miles of gravity sewer
- Clean and Assessment Cost - $901,000
  - *based on current continuing contract unit costs*
- Rehabilitation / Repair / Replacement Cost - $31,350,00
  - *based on remediation cost per lf from Year 1 and 2 Condition Assessment Program*
- Project Estimate Cost to targeted area - $32,251,000

Collection System Condition Management Program - Getting Ahead of the Emergency Repairs Recommendations

Recommendation Summary

Description	Miles of Pipe	Clean and Assess	Rehabilitate / Replace	Program Costs
Entire Collection System	833	$10,117,000	$366,885,589	$377,003,000
Top 20% of Prioritized Lift Station Basins	170	$2,071,000	$60,324,000	$62,395,000
High Consequence Gravity Mains within top 20% of Prioritized Lift Station Basins	71	$901,000	$31,251,000	$32,251,000

Request an additional $32 million over 5 years to accelerate the Gravity Sewer Condition Assessment Program in area of greatest need to identify and address failures ahead of the need for emergency Repairs

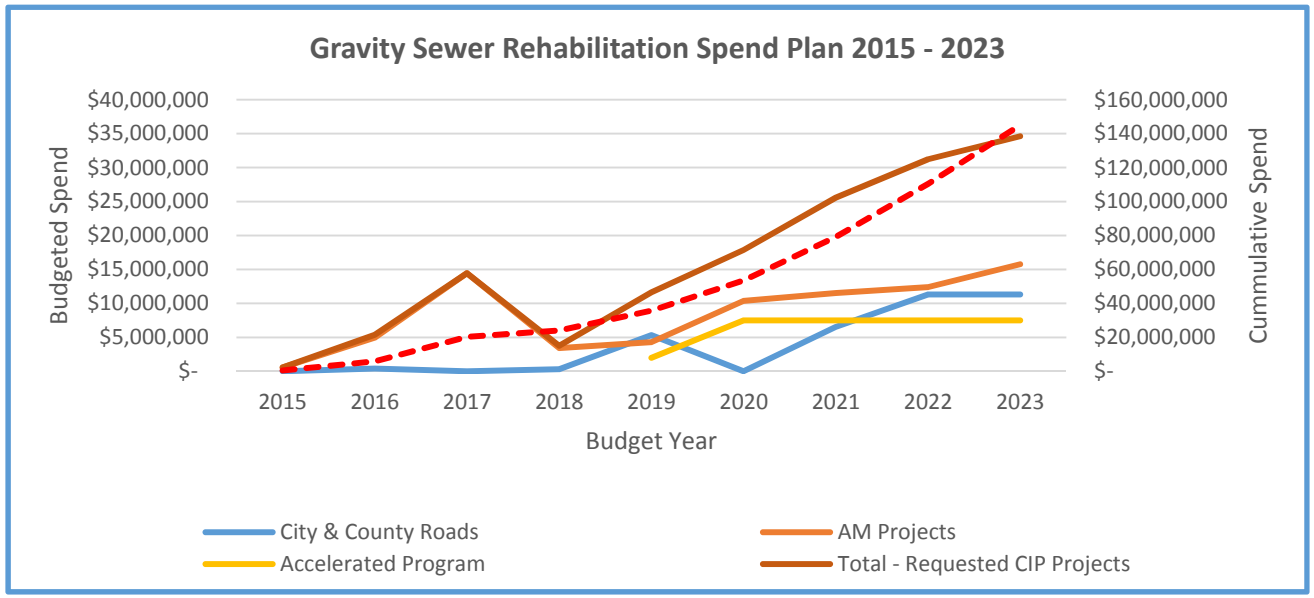
Proposed Schedule

Description	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Clean and Assess first half of Scope						
Identify and Design R/R scope.						
Clean and Assess second half of Scope						
Identify and Design R/R scope.						
Award Construction						
Complete Construction						
Spend Schedule	$2.0M	$7.5M	$7.5M	$7.5M	$7.5M	

Collection System Condition Management Program - Getting Ahead of the Emergency Repairs Recommendations

Funding Request

- Current budget funds known deficiencies identified by completed Condition Assessments
- Funds requested here are in addition to the current requested levels
- Request is to fund an additional $32 million spread over five years



	2015	2016	2017	2018	2019	2020	2021	2022	2023
Planned Spend									
City & County Roads	$ -	$ 423,000	$ -	$ 328,000	$ 5,329,000	$ -	$ 6,540,000	$ 11,327,000	$ 11,327,000
AM Projects	$ 565,000	$ 4,963,500	$ 14,437,500	$ 3,429,000	$ 4,296,000	$ 10,370,000	$ 11,520,000	$ 12,394,000	$ 15,776,000
Accelerated Assessment and Rehabilitation Request					$ 2,000,000	$ 7,500,000	$ 7,500,000	$ 7,500,000	$ 7,500,000
Total - Requested CIP Projects	*$ 565,000*	*$ 5,386,500*	*$ 14,437,500*	*$ 3,757,000*	*$ 11,625,000*	*$ 17,870,000*	*$ 25,560,000*	*$ 31,221,000*	*$ 34,603,000*

Collection System Condition Management Program - Getting Ahead of the Emergency Repairs Recommendations

Expected Benefits

- Lower the overall rehabilitation cost per lineal foot of gravity main
- Reduce/reverse the current trend of Emergency Repairs for the Collection System
- Reduce the number of Collection System Failures
- Reduce Field Services' reactive work order for the Collection System
- Reduce Infiltration into the collection system whereby reducing wet-weather flows to the Lift Stations and Water Reclamation Facilities
    - Reduce energy consumption and extend equipment life at Lift Stations
    - Reduce chemical and electrical use at facilities
    - Return capacity and postpone future facility expansions